Surprised or not surprised?

Investors' reaction to the Comprehensive Assessment preceding the launch of the Banking Union

Abstract

Did the Comprehensive Assessment (CA), preceding the Single Supervisory Mechanism (SSM) launch in Europe, achieve its aims of producing new valuable information for the market? We show that the CA achieved the goal of increasing transparency: investors were able to detect weak banks at the announcement of the procedure (23rd October 2013), but gained full information on the amount of the capital shortfall only at the disclosure of the results (26th October 2014). Furthermore, at the official launch of the SSM (4th November 2014), banks under direct European Central Bank (ECB) supervision registered a more negative market reaction with respect to banks maintaining their national supervisors. Using a regression model including possible confounders and allowing for treatment effect heterogeneity, this negative reaction is confirmed. These findings suggest that, at least in the short run, investors penalized banks subject to direct ECB supervision, probably because of the fear of regulatory inconsistencies.

***JEL classification*:** G21, G28

***Keywords*:** Banking, Supervision; Regulation, Lending, Risk-taking.

1. Introduction

After the financial turmoil triggered by subprime mortgages in summer 2007, the systemic risk of European banks increased dramatically, reaching its peak in November 2011, with large scale banking rescues occurring in all major EU economies (Molyneux et al., 2014). The global financial crisis and the following European sovereign debt crisis led policymakers to recognize that the traditional micro-prudential approach to financial stability needed to be complemented with a system-wide macro-prudential approach (Black et al., 2016). In this context, the ECB intervened decisively with both standard and non-standard monetary policy interventions, enhancing liquidity conditions to restore the banking system (Ricci, 2015). The ECB not only adopted exceptional monetary policy measures, but also took charge of bank supervision. Recognizing the need for reshaping banking supervision (Girardone et al., 2013; Barth et al., 2013; Matousek, 2011; U.S. Financial Crisis Inquiry Commission, 2011), the European Commission changed the European Banking supervisory system in autumn 2012 by creating a Single Supervisory Mechanism (SSM) led by the European Central Bank (ECB). Specifically, starting from November 4th, 2014, the SSM has involved a transfer to the European level of the regulatory and institutional framework responsible for the safeguard of the robustness and the stability of the banking industry. The most significant 130 banks in 19 countries (representing assets worth €22 trillion, i.e. 82% of total banking assets in the Euro zone) now fall under the direct supervision of the ECB, while the National Supervisory Authorities (NSAs) maintain the direct supervision (in collaboration with the ECB) of the remaining banks.

As an essential part of the preparation for the SSM, the ECB and the NSAs carried out a Comprehensive Assessment (CA) announced on the October 23rd, 2013, and completed on October 26th, 2014, in order to "*provide the necessary clarity on the banks that will be subject to the ECB's direct supervision*" (ECB 2013, p. 1). Explaining the rationale of the CA, the ECB (2013) underlined that supervisors and regulators had already taken many actions to address the adverse consequences of the global financial crisis and many banks had already raised new capital to reinforce their positions. However, the ECB also stated "*weaknesses remain, compounded by the perception that banks' balance sheets are not transparent and concerns about their overall risk situation*" (ECB, 2013, p. 2). As further specified by the ECB (2013, p. 2), "*The exercise has three main goals: transparency, that is, enhancing the quality of information available concerning the condition of banks; repair, by identifying and implementing necessary corrective actions, if and where needed; and confidence building, namely assuring all stakeholders that banks are fundamentally sound and trustworthy*".

With respect to other regulatory stress test exercises conducted in Europe or in the U.S., the CA is particularly interesting because it was launched as a preliminary step for a much larger process, the implementation of the Single Supervisory Mechanism (SSM), with the most significant banking institutions falling under direct ECB supervision and the others maintaining national supervisors. Although it is true that the SSM consequences may be fully analyzed in the long term, it is possible to have a first assessment focusing on stock markets. Our paper aims to verify whether the CA reached its main objectives. Specifically, we focus on the CA's aims of increasing transparency and building confidence.

Our paper answers the following two questions: did the CA produce new valuable information for the market? Did the CA have a positive effect on the stock price of involved institutions?

The main contribution of our paper is that, to our knowledge, it is one of the first studies to provide empirical evidence of the market reaction to every single step of the CA, and to link this stress exercise to the wider SSM process. Specifically, by observing market reaction from the beginning to the end of this procedure, we are the first paper to investigate whether the CA really increased transparency and confidence in banking, as stated in its aims. Our results have important policy implications for supervisors since we shed some light on investors' perceptions about this crucial change in the European banking supervision.

The rest of the paper is structured as follows. First, we review previous studies and develop our research hypotheses (section 2). Second, we run a preliminary inspection of market reaction to several CA announcements (section 3), and then we discuss our main results about the information produced by this review exercise (section 4). Finally, we run further investigation to detect some potential SSM effects in investors' reaction (section 5). Conclusions are drawn in section 6.

2. Literature, contribution and hypotheses

This paper focuses on the first fundamental step of the European supervisory architecture revolution, i.e., the Comprehensive Assessment (CA) run in preparation of the SSM. As such, we contribute not only to the recent research stream on

regulatory stress tests, but also to the more established literature on financial stability, bank regulation and supervision.

The literature on regulatory stress tests performed by European or U.S. supervisory authorities has grown fast in the last years, including both theoretical and empirical papers. Theoretical studies mainly discuss whether results from supervisory stress tests should be disclosed or not. Following Bernanke (2013), the disclosure of stress tests results promote transparency by providing investors with consistent and comparable information about banks' financial conditions. Other authors recognize the benefits of disclosure, but also point to potential problems (Hirtle and Lehnert, 2014; Goldstein and Sapra, 2015), especially the so-called Hirshleifer effect (i.e., disclosing too much information destroys risk-sharing opportunities and reduces liquidity in the interbank market). Goldstein and Leitner (2015) conclude that in time of crisis risk-sharing arrangements are already seriously compromised by the general perception that banks are under-capitalized and (partial) disclosure of regulatory stress tests becomes optimal and able to produce a stabilizing effect. In order to produce this reassuring effect, it is important that regulatory stress tests do produce new and valuable information to the market, increasing transparency on banks' financial conditions. A complementary set of empirical papers assess market reactions to these regulatory exercises and/or try to assess whether or not they were able to increase transparency.

To our knowledge, only a small number of papers analyze the market reaction to the stress tests performed by the U.S. or European supervisory authorities (e.g., Candelon and Sy, 2015). Focusing on the U.S., Morgan et al. (2014) find that

the 2009 stress test conducted on the 19 largest U.S. bank holding companies produced valuable information for the market. Before the results were disclosed, investors had already identified weak banks. More in details, the authors demonstrate that the market reaction at February 2009 (the so called "date of clarification") is a good predictor for the capital gap disclosed two months later, in May 2009 (the so called "date of results"). With the publication of results, investors gained information on the size of the capital gap, and banks with larger gaps experienced more negative abnormal returns. Dealing with Europe, Petrella and Resti (2013) provide evidence that the 2011 European Banking Authority (EBA) stress test produced valuable information for the market and investors were not able to anticipate its results. They also find that the stock market reacted not only to detailed historical data released after the test, but also to indicators of the bank's vulnerability to simulated downturn scenarios. Acharya et al. (2014) compare the capital shortfall measured by regulatory stress tests - conducted both in Europe and in the U.S. - to that of a benchmark methodology that employs only publicly available market data. This alternative methodology assumes a crisis scenario, defined by a 40% drop in the market equity index over six months (see Acharya et al., 2012). Results show that regulatory stress tests could be more effective using capital adequacy definitions based on total assets and market risks, rather than on risk weighted assets.

Not surprisingly, there are very few papers focusing on the market reaction to the CA results (e.g., Bank of Italy, 2014; Sahin and de Haan; 2015), due to its very recent and fast launch. Bank of Italy (2014) assessed the market reaction to the announcement of CA results as follows: "*The share prices of the banks for which*

capital strengthening requirements emerged recorded large losses owing to the dilution effect of any capital increases. The risk premiums on the CDS of almost all the banks involved in the exercise narrowed in the days immediately following 26 October, reflecting increased confidence on the part of investors; these improvements were subsequently scaled back" (Bank of Italy, 2014, p. 31). Sahin and de Haan (2015) run an event study analysis by country finding a strong heterogeneity across several Euro area members.

Our study has a different perspective from the existing papers on the European case, since we aim to analyze the market reaction related to the CA, not only at the date of the results' disclosure, but also in each previous intermediate step. After the event study analysis, similarly to Morgan et al. (2014), we focus on two main dates, the announcement of the procedure and the disclosure of results, assuming that the reaction at the announcement date is a measure of the investors' expectations about the results. Consequently, at the announcement date, we expect a negative market reaction for treated banks supposed to register a capital shortfall in the CA. At the results date, the market reaction is expected to be positive if the expected capital shortfall is higher than the realized shortfall disclosed by the ECB, or negative otherwise. As a consequence, at the results date, if the stress test produces new significant information, it is possible to register both positive and negative reactions, depending on previous expectations about every single bank's conditions. At the opposite, if the stress test does not produce new valuable information, there are no significant abnormal returns in the stock price of involved banks. This is consistent with Flannery et al. (2015) outlining that, when announcement dates are known well in advance by investors, as in the case of stress

test disclosure of results, their information content must be evaluated in relation to the market's prior beliefs. We believe that the CA was able to produce new information, similarly to previous stress tests conducted in the U.S. and in Europe. Our first hypothesis is the following:

H_1: *At the announcement of the procedure, investors were not able to predict the magnitude of the capital shortfall revealed at the results date, i.e., the exercise produced valuable information for the market and reached the goal of increased transparency.*

With respect to the existing literature on regulatory stress tests, we add a further analysis motivated by the specialness of the CA as a first step of the new European supervisory architecture. As outlined by Doumpos et al. (2015), the crisis re-opened the debate on the optimal supervisory architecture, since theory and limited empirical evidence provide mixed results on the effect of Central Banks' independence and involvement in financial supervision. In a second step of our paper, we not only consider banks subject to the CA (with a capital shortfall or not), but we also consider a control sample of European banks excluded from the procedure. In this way, we aim to explore the reaction of banks outside the SSM. This sample group allows us to evaluate whether investors were worried only about the CA exercise or, more generally, about the change in the supervisory mechanism. Although we are aware that the consequences (especially long-term effects) of switching from a Multiple Supervisory Mechanism (MSM) to a Single Supervisory Mechanism (SSM) will be visible in the medium-long run, the endeavor of our analysis is to show that this change has generated immediate reactions in the

investors' behavior since its launch date. This change is expected to be perceived as very relevant, even in the short run, for at least three reasons: 1) the fragmentation of the European banking sector due to national characteristics (Matousek et al., 2015); 2) the significant heterogeneity in the supervisory style adopted by different NSAs operating in the Euro-area countries (Carretta et al., 2015); and 3) the consensus emerged after the financial crisis on the necessity to adopt a more intrusive approach to EU bank supervision (e.g., Nouy, 2013). Our expectation is also based on the consideration that the new European SSM has similar features to state charter banking in the United States. Agarwal et al. (2014) provide empirical evidence that the U.S. regulators in the dual supervisory mechanism implement identical rules inconsistently, due to differences in their institutional design and incentives, and that this behavior can adversely impact regulatory effectiveness. Of course, this may also happen in the new European SSM: investors may have reacted to the launch of the SSM by discriminating between banks falling under the direct ECB supervision and other banks remaining under the direct NSA supervision. In this case, the goal of confidence building may have been hindered by the uncertainty about the severity of future scrutiny for different banks. Specifically, our second hypothesis is the following:

H_2: *When the SSM was launched, investors penalized banks subject to the direct ECB supervision with respect to banks maintaining national supervisors.*

3. Did investors react to ECB press releases related to the Comprehensive Assessment?

As a first step, we measure market reaction around all announcements related to the Comprehensive Assessment. We collected data for all listed banks in every country of the European Union, distinguishing between "treated banks" (i.e., banks subject to the CA) and "untreated banks" (i.e., banks not subject to the CA). Since the number of listed banks in Europe is quite small, we included in the group of "untreated" banks all European listed banks (not only in the Euro area) out of the CA and under the direct supervision of NSAs, i.e., both small listed banks in countries under the SSM and listed banks in European countries outside the Euro area (e.g., the UK).

Daily stock market data were obtained from Datastream: we restricted our selection to major securities (the most traded equity) and primary quotes (not the cross-listings). We estimate abnormal returns (ARs) as the difference between actual stock returns and expected returns (i.e., those expected in the absence of relevant events). Following a common procedure to estimate ARs in banking (e.g., De Long and De Young, 2007), we use the market model (MacKinlay, 1997) in which normal returns for every *i-th* observation (R_{it}) are obtained as a function of the market portfolio return (R_{Mt}), represented by a world equity index (i.e., the MSCI World Index). Market model parameters are obtained with daily log returns of bank stock prices over a 252-day estimation period, ending 20 days before the announcement[1]. ARs are then obtained as the difference between the actual stock return and the

[1] We drop stock price series that are not complete for the whole estimation period and/or are strongly illiquid.

return predicted by the market model. ARs are then cumulated over a time period (Cumulative Abnormal Return, CAR) around the announcement date (t=0). Following Morgan et al. (2014) and other papers measuring market reaction to policy announcements (e.g. Fiordelisi and Ricci, 2015; Onali et al., 2016), we focus on very short event windows, in order to limit the problem of overlapping events; we focus on the following event windows: (-1; +1), (0,+1) and (0,0). We then calculate the Cumulative Average Abnormal Return (CAAR) as the mean of our CAR estimates in each event window. After the calculation of CAARs, we test the hypothesis of a market reaction significantly different from zero. To account for the variance increase in ARs with respect to the estimation period during the days near the event, we follow the approach proposed by Mikkelson and Partch (1988) and then adopted in some recent studies (e.g., Harrington and Shrider, 2007), suggesting to use the Boehmer et al. (1991) test statistic. A recent study by Kolari and Pynnönnen (2010) proposes a new test statistic that modifies the one suggested by Boehmer et al. (1991) in order to consider possible cross-sectional correlation among abnormal returns.

Table 1 reports the list of the considered events related to the CA, while Table 2 shows the results from the event study on each date. We have an initial total sample of 158 listed institutions, of which 50 banks were involved in the CA (the detailed composition by country is reported in Table 2, Panel A). For each date, the effective number of observations for the event study depends on the availability of a complete and liquid stock price series. Besides considering the difference between banks involved or not in the CA, we also focus on the distinction between banks registering a capital shortfall or not at the end of the procedure (gap banks were 15

out of 50; as in the previous case, the effective number of observations for the event study in each date depends on the availability of complete and liquid stock price series). As expected, looking at CAARs and differences in mean among different subgroups of banks (reported in Table 2, Panel B), it is evident that the most important dates are the first and the last ones.

At the first date, 23rd October 2013, the ECB announced details for the comprehensive assessment procedure and disclosed the list of involved institutions. At this date, CAARs for banks involved are negative in all the considered event windows and greater in magnitude with respect to banks not involved in the CA. The difference in mean between the two samples is always negative and statistically significant, at least at the 10% confidence level. In order to understand whether this difference derives from the investors' expectation of a capital shortfall for some banks involved, we also consider the difference between the subsamples of CA banks registering a capital shortfall and CA banks without a shortfall. CAARs are generally negative for both subgroups, but the reaction is particularly strong for shortfall banks, especially at the date of the announcement, when the CAAR is -3.61%, statistically significant at the 5% confidence level even after the correction suggested by Kolari and Pynnönen (2010). These results suggest that investors were able to detect banks with a shortfall resulting from the CA already at the date when the beginning of the procedure was announced. On the other hand, the negative reaction registered also for banks without a shortfall may indicate that there was high uncertainty about CA results or that something else was driving market reactions.

At the second date, 3rd February 2014, the ECB announced the progress made with the Asset Quality Review and confirmed the use of the parameters set by the EBA for conducting stress tests. In this case, we do not find significant differences between the average market reaction of banks involved or not in the procedure, nor between banks with or without a shortfall. It is likely that no new relevant information was given to the market on this day (this is not surprising if we consider that the parameters for the stress tests were already disclosed by the EBA some days before, at the end of January).

At the third date, 11th March 2014, the ECB published the manual for the Asset Quality Review. Market reaction appears to be more positive for involved banks, and for banks registering a capital shortfall. It is likely that interested investors were waiting for the final manual containing all details about a crucial pillar of the CA and that they were satisfied to receive this complete information, reducing uncertainty about the procedure.

At the fourth date, 29th April 2014, we find a similar situation. The ECB communicated how capital shortfall resulting at the end of the CA must be addressed. The disclosure of more information about the procedure appears to be beneficial for banks subject to the CA, while there are no statistically significant differences between banks with and without a shortfall (when considering this second categorization, it is always worth to remember the reduced number of observations that may strongly impact the statistically significance of results).

At the fifth date, 17th May 2014, the ECB published the disclosure template for communicating results. The average market reaction is more negative for banks

involved in the procedure, and especially for banks registering a shortfall. It is likely that investors were worried for these banks showing their weak financial and capital situation in such detailed format, very standardized and allowing a direct, easy, and fast comparison with main peers (and competitors).

At the sixth date, 10th October 2014, the ECB stated that the CA results would be published on the 26th October 2014. The reaction is more positive for involved banks, and for banks registering a capital shortfall, consistently with previous results (i.e., interested investors seem to appreciate the reduction of uncertainty about operational details).

At the seventh date, 22th October 2014, referring to media news about the CA, the ECB clarified that no official results would be disclosed until the 26th October. In general, this declaration is welcome by investors.

Finally, on the 26th October, CA definitive results were disclosed. The market reaction is generally negative for banks involved in the procedure, especially for banks registering a capital shortfall. For the latter, considering the (0;+1) event window, the CAAR is -5.27%, statistically significant at the 10% confidence level even after the correction suggested by Kolari and Pynnönen (2010). This evidence suggests that investors gained new information at this date, relative to the effective magnitude of the capital shortfall. This point will be studied in more details in section 4. It is also worth noticing that CAARs are negative and show a material dimension also for banks without a capital shortfall in all the considered event windows. These findings, considered together with those related to the first announcement date, seem to suggest that banks involved in the CA were worried by

something other than the potential dilution effect due to a capital shortfall. This point will be studied in more details in section 5.

4. Did the CA provide the market with new information reaching the objective of increased transparency?

The event study analysis suggested that investors had a negative reaction both at the date when the CA was announced (23rd October 2013) and at the date when results were disclosed (26th October 2014). Looking at the difference between the subgroups of banks that registered a capital shortfall and those who did not, it is likely that investors were already able to detect weak banks in October 2013, but were not fully aware of the magnitude of the capital shortfall, revealed only in October 2014.

In order to support this view, we focus only on banks subject to the CA and we adopt a methodology similar to Morgan et al. (2014). Their main idea is that investors, at the disclosure of results, do not react to the simple capital shortfall communicated for each bank, but rather to the difference between this capital shortfall and their expectation about it. The larger this difference is, the more negative is the market reaction. The main problem is how to measure investors' expectations. As outlined by Morgan et al. (2014), analysts' forecasts are quite sporadic and rarely available for all banks. In addition to this, as seen in the previous section, the ECB has discouraged the market to trust "unofficial" results. As such, Morgan et al. (2014) propose to proxy investors' expectations using the market reaction registered in an announcement date preceding the disclosure of results, so

they chose the so called "clarification date", in which the market was reassured that gap banks would not be nationalized. In our paper we use the first date in which the CA was announced, since the event study has outlined this date as the most significant and with the strongest difference between shortfall and no shortfall banks. Specifically, we assume that the market reaction on the 23rd October 2013 (CAR^{a}) is strongly and negatively associated to the expected gap. We can then write the expected GAP as $EGAP_i = \delta_0 - \delta_1 CAR_i^a + u_i$. Since $EGAP_i = GAP_i + e_i$, we can estimate the following model:

$$GAP_i = \delta_0 - \delta_1 CAR_i^a + \omega_i, \qquad \omega_i = u_i - \varepsilon_i \tag{1}$$

where GAP is the capital shortfall resulting from the CA for the i-th bank (revealed to the market on 26th October 2014), CAR^{α} is the cumulated abnormal return registered by the i-th bank at the announcement of the procedure (on 23rd October 2013). We posit a significant negative relationship between the expected gap and the CAR registered at the announcement of the procedure[2]. If the (negative) market reaction at the result date (CAR^{r}) is mainly driven by the dilution effect generated by the unexpected gap, we will have:

$$CAR_i^r = \mu_0 - \gamma_1 [GAP_i - E(GAP_i)] + \varepsilon_i \tag{2}$$

Providing that CAR^{α} is a reasonable proxy for the expected gap yields the following model:

$$CAR_i^r = \hat{\mu}_0 - \hat{\gamma}_1 GAP_i - \hat{\gamma}_2 CAR_i^{\alpha} + \eta_i \tag{3}$$

[2] Taking into account the truncation of GAP by running a Tobit regression rather than an OLS does not affect our results.

where CAR^r is the market reaction for the i-th bank at the announcement of results, GAP is the capital shortfall resulting from the CA, γ_2 is the product of $-\gamma_1$and $-\delta_1$ and CAR^α is the market reaction at the announcement of the procedure. As illustrated in Equation (3), if investors negatively react to the difference between the declared and the expected gap, the coefficient for GAP and CAR^α will be both negative. The difference with Morgan et al. (2014) is apparent as in our case the expected sign for CAR^α is negative because of the negative relation ($-\delta_1$) between CAR_i^α and $E(GAP_i)$. Put differently, in our case the announcement of the CA is bad news for weak banks, while in Morgan et al. (2014) the clarification date is good news for weak banks since stock market participants were reassured that gap banks would not be nationalized.

Table 3 reports results for estimating model (1) and (3) using different event windows. Results from equation (1), shown in Panel A, demonstrate that the capital shortfall registered for each bank[3] is negatively related to the market reaction at the announcement date. The coefficient for CAR^α is negative and statistically significant at the 10% confidence level or less in two out of three specifications. The model also includes a dummy, named *Control*, identifying four banks (Eurobank, National Bank of Greece, Nova Ljublijanska bank, and Nova Kreditna Banka Maribor) that registered a shortfall, but were in special situations (e.g., State guarantees, restructuring plans, etc.) for which there was no need for capital raising measures (see ECB, 2014, p. 10). The R-squared ranges from 27.9% to 43.3%, similarly to the one obtained by Morgan et al. (2014). This supports the idea that, on the 23rd

[3] It is measured in basis points. In addition, all variables included in the model are standardized.

October 2013, investors were already able to predict which banks would register a capital shortfall during the CA.

Results from equation (3), are shown in Panel B. Conditioned by existing expectations, a larger declared gap means a stronger dilution effect; consistently, the coefficient for GAP is negative in all models (statistically significant at the 10% confidence level or less in all specifications). These findings provide evidence in support of H_1, confirming that investors were already able to detect weak banks at the announcement date, but the CA produced new valuable information clarifying the magnitude of the capital shortfall.

An interesting point is that CAR^{α} enters the model with a positive coefficient (statistically significant at the 5% confidence level or less in all specifications). This shows a positive correlation between the market reaction at the announcement date and at the disclosure of results, i.e., banks that were already identified as weak at the beginning of the procedure registered a worse stock price reaction also at the final date. In other words, the expected gap does not weaken the negative market reaction to the effective capital shortfall, but reinforces it. This suggests that investors penalized weak banks twice: once at the time of the CA launch and then at the time of the disclosure of CA results. This is apparently surprising. As in Morgan et al. (2014), one might expect that CARs at the disclosure of results should reflect only the unexpected portion of the shortfall: however, this is true only if the capital shortfall is the only driver of market reaction. In our case, differently from Morgan et al. (2014) that analyze the US banking industry, something else is worrying the investors (the SSM launch) producing an amplified negative reaction for banks

confirmed as weak by the final CA results. This result is consistent with the peculiarity of the CA that is not only a regulatory stress test, but also the initial stage of a new supervisory model, probably perceived as more intrusive with respect to the past (see also Fiordelisi, Ricci, Stentella, forthcoming). Finally, it is worth noticing that some banks raised capital between December 2013 and September 2014, even before the disclosure of CA results. If we include a measure for these recapitalization interventions in our second model, it takes a positive coefficient (as expected), but it is not statistically significant, probably due to the fact that the capital raised was generally unable to cover the entire shortfall[4].

5. Were investors reassured by the CA and the launch of the SSM?

Results from previous sections show a negative market reaction both at the announcement date and at the disclosure of results, even for banks not reporting a capital shortfall in the Comprehensive Assessment. Furthermore, we also find some evidence that the capital shortfall (expected and then declared) is not the only driver of market reaction. In this final step, we try to understand whether investors were worried by something else, i.e., by possible supervisory inconsistencies and by the adoption of a more intrusive approach deriving from a Single Supervisory Mechanism. To this aim, we focus on the 4th November 2014, when the market had already been fully informed about the output of the CA and the launching of the SSM was announced. In this way, we try to neutralize the CA effect and to isolate investors' expectation about the future of the SSM. As in section 3, we distinguish

[4] Results are available from the authors upon request.

between “treated banks” (i.e., banks subject to the SSM) and “untreated banks” (i.e., banks not subject to the SSM). In this respect, it is important to outline that on 4th September 2014 the ECB published a final list of significant institutions excluding some banks involved in the CA (e.g., Credito Emiliano in Italy). Since these banks will maintain their national supervisors, but have been considered as significant for the greatest part of the process up to now, we consider all results of this section, including them in the sample of “treated”[5]banks.

First of all, we consider results from an event study analysis on the 4th November 2014, summarized in Table 4. It is evident that both treated and untreated banks exhibit a negative average reaction, but the magnitude is larger for treated banks. We also observe a significant difference between the two subgroups in the shortest event window, i.e., exactly at the date of the announcement (0;0). This evidence, together with the negative reaction at the disclosure of results also for banks involved in the CA, but without a capital shortfall (see Table 2), supports the idea that investors were not worried only about the CA exercise (completed in October 2014 and with consequences already incorporated in stock prices). Is it possible to infer a negative treatment effect for the SSM, linked to the fear of regulatory inconsistency and, in particular, that ECB would prove stricter than national supervisors.

In order to answer this question, we try to estimate the treatment effect of the direct ECB supervision considering a binary treatment variable (named as *w*), taking value 1 for treated and 0 for untreated banks. Our dependent variable is the CAR

[5] Exclusion of these banks does not change conclusions. Results are available from the authors upon request.

estimated in the previous step. As outlined by Imbens and Woolridge (2009), experimental settings remain relatively rare in economics and policy evaluation, while it is more frequent to rely on observational data. The authors also recognize that observational data pose significant challenges in estimating causal treatment effects, with the exception of the special case referred to as unconfoundedness or selection on observables. In this case, it is possible to remove all biases in comparisons between treated and control units by adjusting for differences in observed pre-treatment variables. More in details, in our analysis, we are in a "non-experimental" set-up, but the following elements allow us to restore randomization. First, the selection of banks subject to the CA is based on observable pre-treatment characteristics, explicitly declared by the ECB, i.e., the location of banks (in the EMU area) and their relative size (total assets with respect to country GDP, *Res*). Second, it is reasonable to exclude a severe problem of self-selection (i.e., individuals choose or not to apply for the treatment), since banks subject to the CA (and then to direct ECB supervision under the SSM) were selected in the EMU on the basis of their size, which is not a variable under management control, at least in the short run.

Once the self-selection is excluded and the knowledge of the factors affecting the sample selection is taken into account, the condition of randomization is restored and it is possible to adopt a simple OLS approach, controlling for these factors (Cerulli, 2014).

One might also claim that investors were penalizing treated banks for some of their specific features not necessarily related to the SSM, such as poor

profitability or low capitalization. In order to overcome this limitation, we estimate the treatment effect considering several possible confounding effects, both at the macro and the micro level. At the macro level, we include the level of state aid provided by governments to the banking sector during the financial crisis (*Sta*), the level of country wealth (measured by nominal GDP), and the level of competition in the banking industry (measured with the HHI index). At the micro level, we take into account the level of profitability (*ROA*) and capitalization (equity on total assets, *ETA*).

Specifically, we run a model with idiosyncratic (or heterogeneous) average treatment effect. As outlined by Cerulli (2014), the benefit of this model is that it allows for generalization of the regression approach typically used in standard program evaluation by considering potentially heterogeneous response to treatment. From an operational point of view, the existence of this heterogeneity is considered by introducing interactions between the binary treatment variable and the covariates of interest in the outcome equation. Assuming heterogeneity in treatment response, the Average Treatment Effect (ATE) obtained is different from either the average treatment effect on treated banks (ATET) or the average treatment effect on non-treated banks (ATENT), since the parameters ATE, ATET, and ATENT are no more single values, but are functions of the control variables included in the regression. Consequently, since each bank has its own values of these variables, we will have "*individual specific average treatment effects*". Consistent estimates of ATE, ATET, and ATENT are obtained assuming the validity of the Stable Unit Treatment Value

Assumption (SUTVA), i.e., excluding that the treatment of a unit affects the outcome of another unit[6].

All variables used in the analysis are defined in Table 5, while Table 6 presents the main summary statistics. It is possible to observe that treated and controls present significant differences in some variables: treated banks are located in countries that, on average, are richer and have guaranteed more state aids to financial institutions during the crisis period. Furthermore, treated banks are on average larger and less capitalized.

Our main results are shown in Table7, columns (1) and (2). We provide two different specifications: our first specification is for the abnormal return (0;0) on 4th November 2014. We choose the shortest event window since it is the only one showing a significant difference in mean between the groups of treated and untreated banks in the event study (see Table 4). A second specification analyzes the same event window for the results date (26th October 2014). The first specification is our favorite, since results from the CA have already been announced and incorporated in stock market prices. However, findings are quite similar, and the following comments refer to the main specification. The investors' reaction displays a negative statistically significant link with the treatment variable (*w*). This means that considering the bank characteristics that determine the treatment and other possible features generating heterogeneity in the treatment effect, banks subject to the direct supervision of the ECB were penalized by the market. It is also interesting to comment on the coefficients assumed by the interaction between the treatment

[6]All formulas for the calculation of relevant parameters are reported in a Technical Appendix available from the authors upon request.

variable and some macro or micro variables. More in details, there is some evidence that the treatment effect is more negative for institutions located in countries where the banks received more state aids as a response to the global financial crisis, probably because these banks were perceived as weaker and then more susceptible with respect to potentially stricter supervision. Conversely, investors seem to be less worried about the change in banking supervision when the banking system presents a higher level of concentration, reducing competition and then market pressures. Looking at micro-variables, the treatment effect appears to be more negative for banks with higher level of profitability, possibly corresponding to a high level of risk. Columns (3) and (4) report models in which we include squared terms, in order to investigate potential non-linear effects. The treatment variable remains negative and statistically significant, at least at the 10% confidence level[7].

<< INSERT TABLE 7>>

By analyzing summary statistics about ATE(X), ATET(X), and ATENT(X), reported in Panel B, we observe that the average ATENT(X) is always negative as is the average ATET(X). This indicates that, considering the effect of several possible confounders, untreated banks would have experienced a very similar negative reaction with respect to treated banks if they had been subject to the same treatment. This reinforces the idea that the negative reaction of investors is not mainly due to

[7] We thank an anonymous referee for this suggestion. Most squared terms are not significant, so we prefer to keep the Table more parsimonious and not to show detailed coefficients. However, results are available from the authors upon request.

some specific features of the group of treated banks, but to the treatment in itself, supporting H_2.

6. Robustness checks

In this section, we provide some robustness checks to test the reliability of results from our main models shown in Table 7. First, we restrict the sample in order to have a comparable average bank size in the subsamples of treated and controls. As suggested by Imbens and Woolridge (2009), the simple linear regression model is reliable when the variables determining the treatment are known, and the normalized difference of these variables between treated and controls is not too large. As it is possible to observe from Table 5, Panel B, the size relative to GDP is significantly larger for treated banks than for controls. In order to remove this significant difference, we drop from our analysis all controls for which the relative size is below the minimum value registered for treated banks. As reported in Table 8, Models (1) and (2), the number of observations drop from 118 to 89, but results remain qualitatively unaltered: our treatment variable remains negative and statistically significant at least at the 5% confidence level.

Second, we have to consider the possibility that some relevant confounding events happened around the considered announcement dates. We search Lexis Nexis for relevant news in a (-5;+5) window around both the announcement of CA results (26 October 2014) and the official launch of the SSM (4 November 2014). We also draw information from the press release section of all sample banks' institutional websites. We include news related to change in top management (Chief Executive

Officer, Chief Financial Officer, or Chief Operational Officer turnover), M&A deals, rating changes, and shares or bonds issuance. As we can see from Models (3) and (4) of Table 8, our main results remain qualitatively unaltered, with the coefficient for our treatment variable being negative and statistically significant at least at the 5% confidence level[8].

7.Conclusions

In autumn 2012 the European Commission went through an epochal change in the European Banking supervisory system by creating a Single Supervisory Mechanism (SSM) led by the European Central Bank (ECB). Since November 4th 2014, the most significant banks in the Eurozone have fallen under the direct supervision of the ECB, while National Supervisory Authorities (NSAs) maintain the direct supervision of the remaining banks.

The preliminary step to the launching of the SSM was a Comprehensive Assessment consisting of a supervisory risk assessment, an asset quality review, and a stress test for all the significant institutions under direct ECB supervision. This complex exercise aimed at increasing transparency on the condition of banks, applying the necessary corrective actions to their balance sheet, and building confidence among stakeholders. The purpose of this paper is to understand whether the CA reached its transparency and confidence building objectives, contributing to both the literature on regulatory stress tests and on the design of the supervisory architecture in Europe.

[8] In untabulated results we also put together our two main robustness checks, running a model with similar size for treated and controls and no confounding events. The number of observations is significantly reduced, but our treatment variable remains negative and statistically significant. Results are available from the authors upon request.

The first step of our empirical analysis focuses on the market reaction at the announcement of the CA and at the disclosure of results, examining the difference between banks that register a capital shortfall and those that do not. Following the methodology applied by Morgan et al. (2014), we show that investors were already able to identify weak banks at the announcement of the procedure, but the CA exercise was able to produce new valuable information. This indicates that the CA was successful with respect to the aim of increasing transparency, confirming our first research hypothesis, (H_1: *At the announcement of the procedure, investors were not able to predict the magnitude of the capital shortfall revealed at the results date, i.e., the exercise produced valuable information for the market and reached the goal of increased transparency).* Our results have important policy implications, since they confirm previous findings for the U.S also for the Euro area. (Morgan et al., 2014). Specifically, we show that the implementation of regulatory stress tests and the disclosure of results were able to produce new valuable information for investors. In a period of severe crisis, this new information is essential to reduce uncertainty and restore transactions among financial institutions (Bernanke, 2013).

The second step of our empirical analysis focuses on a treatment effect model comparing banks subject to direct ECB supervision and a control sample of banks maintaining their national supervisors. Using a regression model including possible confounders and allowing for treatment effect heterogeneity, we find a negative treatment effect for banks subject to direct ECB supervision, which were penalized both at the disclosure of CA results (26th October 2014) and at the official launch of the SSM (4th November 2014). Findings are in support of our second

hypothesis: H_2: *When the SSM was launched, investors penalized banks subject to the direct ECB supervision with respect to banks maintaining national supervisors.*

This adverse effect may be due to various reasons: this is unlikely to be a dilution effect due to expected recapitalizations following the CA results, which had been already incorporated in stock prices at the time of the CA disclosure (26th October 2014). It is more likely the effect of the investors' expectation for a different supervision of banks under the ECB direct control with respect to banks remaining with their national supervisory authorities. More specifically, this suggests that investors expect a more intrusive approach by the ECB, or at least are worried about a possibly heterogeneous application of supervision rules for treated and control banks. For these reasons, at least in the short run, investors were not completely reassured by the CA and the launch of the SSM, so the CA declared goal of "building confidence" appears to have been limited by uncertainty about the future of supervision.

Acknowledgments

We would like to thank Thorsten Beck, Emilia Bonaccorsi di Patti, Santiago Carbo, Federico Cecconi, Giovanni Cerulli, Roy Cerqueti, Vincenzo Chiorazzo, Giorgio Di Giorgio, Olivier de Jonghe, Mauro Grande, John Kose, Iftekhar Hasan, Marco Pagano, Bianca Potì, Klaus Schaeck, Enrico Sette, Gaetano Spartà, Amine Tarazi, Anjan Thakor, and conference and seminar participants at Financial Intermediation Network of European Studies, LAPE meeting, Banca d'Italia, CNR-GRAPE, Durham Business School, University of Rome Tor Vergata for helpful comments.

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Table 1
The pivotal moments of the Comprehensive Assessment

This table reports the most important ECB press releases related to the CA.

October 23, 2013	ECB starts comprehensive assessment in advance of supervisory role. The details of the procedure and the list of involved institutions are disclosed to the market
February 03, 2014	ECB makes progress with asset quality review, and confirms stress test parameters for comprehensive assessment released by the EBA on 31 January
March 11, 2014	ECB publishes manual for asset quality review
April 29, 2014	ECB has today informed banks how capital shortfalls must be addressed following the comprehensive assessment. Banks are given six to nine months to cover capital shortfalls
July 17, 2014	ECB has today presented the process for interacting with banks and the disclosure template for communicating the results of its on-going comprehensive assessment
October 10, 2014	ECB communicates that the CA results will be published on 26 October 2014
October 22, 2014	Statement about media reports ahead of comprehensive assessment results (no official results before 26 October 2014)
October 26, 2014	ECB's in-depth review shows banks need to take further action. CA detailed results for each bank are disclosed to the market
November 04, 2014	SSM starts

Table 2
Investors' reaction to the events related to the Comprehensive Assessment

Panel A - Sample composition by country

This table reports the origin of all listed European banks included in our event study.

	Banks involved in the CA (treated)	Banks not involved in the CA (untreated)	Total
Austria	4	4	8
Belgium	2		2
Bulgaria		6	6
Croatia		11	11
Cyprus	2	1	3
Czech Republic		1	1
Denmark		24	24
Finland		2	2
France	5		5
Germany	3	5	8
Greece	4	3	7
Hungary		1	1
Ireland	2		2
Italy	12	4	16
Lithuania		1	1
Luxembourg		1	1
Malta	2	2	4
Netherlands	1	2	3
Poland		15	15
Portugal	2	2	4
Romania		3	3
Slovakia	2	3	5
Slovenia	1	1	2
Spain	8		8
Sweden		4	4
United Kingdom		12	12
Total	50	108	158

Panel B – Event study results

This table illustrates the descriptive statistics of Cumulated Abnormal Returns estimated over the main ECB press releases relative to the Comprehensive Assessment. We report Daily Abnormal Returns obtained using the market model with a 252-day estimation period. The market portfolio is represented by the MSCI World Index. The statistical significance of Cumulated Average Abnormal Returns (CAAR) is tested using the Boehmer et al. (1991) procedure to capture the event-induced increase in returns volatility. CAARs in bold are those that remain statistically significant also considering the adjustment suggested by Kolari and Pynnönen (2010) in order to account for possible cross sectional correlation of abnormal returns. Source: Authors' elaboration on European Central Bank and Datastream.

	A) Banks involved in the CA				**B) Banks not involved in the CA**				**A vs B**	**A1) Banks with a shortfall**				**A2) Banks without a shortfall**				**A1 vs A2**
23/10/2013	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.
(-1,1)	-1.77%	-0.8144	0.415406	24.44%	0.53%	0.5541	0.579501	57.14%	neg*	0.03%	-0.7669	0.443158	35.71%	-2.58%	-0.7638	0.445015	44.44%	n.s.
(0,1)	-1.27%	-0.8195	0.412520	35.56%	0.52%	0.5554	0.578616	55.84%	neg**	-2.20%	-1.5928	0.111209	21.43%	-0.84%	-0.4959	0.619962	33.33%	n.s.
(0,0)	-2.08%	-1.5202	0.128464	13.33%	-0.25%	-1.1172	0.263892	50.65%	neg***	**-3.61%**	**-2.2785**	**0.022694**	**7.14%**	-1.38%	-1.0916	0.275029	11.11%	neg.***
03/02/2014	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.
(-1,1)	1.41%	0.8583	0.390727	73.33%	0.02%	0.6220	0.533942	54.32%	n.s.	1.48%	0.9491	0.342551	71.43%	1.38%	0.7189	0.472197	88.89%	n.s.
(0,1)	1.03%	0.7251	0.468396	75.56%	0.21%	0.7125	0.476172	56.79%	n.s.	0.67%	0.4124	0.680022	71.43%	1.19%	0.8383	0.401842	88.89%	n.s.
(0,0)	-0.42%	-0.4043	0.685987	46.67%	**0.67%**	**1.8789**	**0.060258**	**69.14%**	n.s.	-1.08%	-0.5304	0.595813	50.00%	-0.12%	-0.2975	0.766052	66.67%	n.s.
11/03/2014	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.
(-1,1)	2.21%	0.4057	0.684961	62.22%	-0.63%	-1.6060	0.108284	32.50%	pos**	**5.37%**	**1.9520**	**0.050936**	**85.71%**	0.79%	0.0854	0.931944	100.00%	pos**
(0,1)	0.88%	0.0372	0.970323	44.44%	-0.73%	-1.6425	0.100482	35.00%	pos *	3.25%	1.3782	0.168128	71.43%	-0.18%	-0.2434	0.807706	88.89%	n.s.
(0,0)	1.53%	0.4691	0.639005	55.56%	0.14%	0.4235	0.671961	53.75%	pos*	3.02%	1.2065	0.227620	71.43%	0.86%	0.2685	0.788328	77.78%	n.s.
29/04/2014	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.
(-1,1)	-0.58%	-0.4725	0.636547	45.65%	-0.44%	-0.2479	0.804186	40.24%	n.s.	1.23%	0.3301	0.741349	64.29%	-1.37%	-0.6467	0.517815	77.78%	n.s.
(0,1)	0.11%	0.0326	0.973974	50.00%	0.26%	0.6012	0.547705	56.10%	n.s.	1.43%	0.5400	0.589218	71.43%	-0.47%	-0.1256	0.900048	77.78%	n.s.
(0,0)	0.83%	1.2775	0.201434	78.26%	-0.08%	0.0490	0.960895	51.22%	pos**	1.34%	1.4583	0.144767	85.71%	0.60%	1.0870	0.277040	88.89%	n.s.

17/07/2014	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.
(-1,1)	0.21%	0.2808	0.778868	59.57%	-0.09%	-0.1015	0.919126	49.40%	n.s.	0.23%	0.3250	0.745203	53.33%	0.20%	0.2418	0.808953	44.44%	n.s.
(0,1)	-1.29%	-0.8244	0.409715	23.40%	-0.10%	-0.8474	0.396780	44.58%	neg***	**-1.75%**	**-1.8508**	**0.064198**	**26.67%**	-1.08%	-0.5814	0.560955	33.33%	n.s.
(0,0)	-0.18%	-0.4430	0.657736	31.91%	0.53%	0.8020	0.422555	55.42%	neg*	-0.69%	-1.2527	0.210326	26.67%	0.05%	-0.2202	0.825715	33.33%	n.s.
10/10/2014	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.
(-1,1)	3.38%	1.5101	0.131008	82.22%	0.02%	0.3189	0.749813	45.68%	pos***	**4.36%**	**1.7379**	**0.082233**	**85.71%**	2.93%	1.2813	0.200103	75.00%	n.s.
(0,1)	2.49%	1.3628	0.172944	82.22%	0.01%	0.1796	0.857468	50.62%	pos***	**2.95%**	**1.7086**	**0.087531**	**85.71%**	2.28%	1.1368	0.255642	75.00%	n.s.
(0,0)	1.14%	0.8389	0.401514	75.56%	-0.02%	0.0711	0.943295	51.85%	pos**	1.40%	1.1292	0.258804	64.29%	1.02%	0.6645	0.506375	62.50%	n.s.
22/10/2014	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.
(-1,1)	**2.48%**	**1.7506**	**0.080014**	**84.44%**	**1.15%**	**1.7308**	**0.083496**	**65.43%**	pos**	2.86%	1.2677	0.204915	78.57%	**2.31%**	**1.7737**	**0.076107**	**75.00%**	n.s.
(0,1)	0.89%	0.8387	0.401634	68.89%	0.43%	0.9067	0.364566	55.56%	n.s.	0.20%	-0.1531	0.878348	35.71%	1.19%	1.2005	0.229953	50.00%	n.s.
(0,0)	0.94%	1.1361	0.255919	75.56%	**0.79%**	**1.9477**	**0.051449**	**69.14%**	n.s.	0.67%	0.2989	0.765052	64.29%	**1.07%**	**1.6600**	**0.096915**	**75.00%**	n.s.
2610/2014	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.
(-1,1)	-2.37%	-1.1969	0.231364	31.11%	-0.72%	-1.2170	0.223605	30.86%	neg**	-3.48%	-1.2454	0.212983	28.57%	-1.87%	-1.0335	0.301355	25.00%	n.s.
(0,1)	-3.02%	-1.6194	0.105354	17.78%	-0.25%	-0.5300	0.596112	46.91%	neg***	**-5.27%**	**-1.6480**	**0.099359**	**14.29%**	-2.01%	-1.5790	0.114332	25.00%	n.s.
(0,0)	-2.50%	-1.3577	0.174567	26.67%	0.07%	0.0613	0.951142	54.32%	neg***	-4.54%	-1.3634	0.172741	35.71%	-1.57%	-1.3334	0.182392	37.50%	n.s.

Table 3
Did the CA produced new information for the market?

Panel A: CAR at the announcement date as a proxy for the expected gap.

This panel shows results from running the model represented by equation (1), in which the capital shortfall resulted from the CA is regressed on the market reaction at the announcement of the procedure. Control is a dummy variable identifying four banks (Eurobank, National Bank of Greece, Nova Ljublijanska bank, and Nova Kreditna Banka Maribor) that registered a shortfall, but were in special situations (e.g., State guarantees, restructuring plans, etc.) for which there was no need for capital raising measures (see ECB, 2014, p. 10).

	(1)	(2)	(3)
Y= GAP	(0;0)	(0;1)	(1;1)
CAR^{α}	-0.530***	-0.298*	0.128
	(0.196)	(0.175)	(0.142)
Control	1.801**	1.751*	1.599*
	(0.868)	(0.935)	(0.845)
Constant	-0.349***	-0.219**	-0.0945
	(0.0992)	(0.101)	(0.118)
Observations	45	45	45
R-squared	0.433	0.315	0.279

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel B: CAR at the results date as a reaction to the unexpected gap.

This panel shows results from running the model represented by equation (3), in which the market reaction at the disclosure of results is regressed on the capital shortfall resulting from the CA and the CAR at the announcement date (as a proxy for the expected gap).

	(1)	(2)	(3)
$Y= CAR^{r}$	(0;0)	(0;1)	(1;1)
GAP	-0.761*	-0.827**	-0.727**
	(0.382)	(0.360)	(0.302)
CAR^{α}	0.553**	0.446**	0.598***
	(0.233)	(0.216)	(0.147)
Control	2.323**	2.632**	1.196
	(1.104)	(1.132)	(0.880)
Constant	-0.393**	-0.480***	-0.201
	(0.183)	(0.167)	(0.176)
Observations	44	44	44
R-squared	0.455	0.456	0.434

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4

Investors' reaction to the launch of the Single Supervisory Mechanism

This table reports the descriptive statistics of Cumulated Abnormal Returns registered around 4 November 2014. We report Daily Abnormal Returns obtained using the market model with a 252-day estimation period. The market portfolio is represented by the MSCI World Index. The statistical significance of Cumulated Average Abnormal Returns (CAAR) is tested using the Boehmer et al. (1991) procedure to capture the event-induced increase in returns volatility. CAARs in bold are those that remain statistically significant also considering the adjustment suggested by Kolari and Pynnönen (2010) in order to account for possible cross sectional correlation of abnormal returns. Source: Authors' elaboration on European Central Bank and Datastream.

	Banks involved in the CA (treated)				Banks not involved in the CA (untreated)				
04/11/2014	CAAR	Z-stat	P-value	% Pos	CAAR	Z-stat	P-value	% Pos	Diff.
(-1,1)	-0.79%	-0.6141	0.539132	28.89%	-0.73%	-1.5384	0.123952	34.57%	n.s.
(0,1)	-0.80%	-0.7785	0.436278	31.11%	-0.93%	-1.3867	0.165530	35.80%	n.s.
(0,0)	-1.55%	-1.5589	0.119024	22.22%	**-0.70%**	**-1.7736**	**0.076123**	**39.51%**	neg**

Table 5

Variables definition

This table defines the variables used in the treatment effect analysis and the sources of data.

Variables	Symbol	Definition and calculation method	Source
Treatment Effect	*w*	A dummy variable taking the value of 1 if the bank is under the ECB direct supervision and 0 otherwise	ECB
Industry concentration	*HHI*	The natural logarithm of the Herfindahl-Hirschman Index	ECB
State Aids	*Sta*	The amount of resources devoted to recapitalization and asset relief purposes over the period 2008-2012, as a percentage of 2012 GDP.	European Commission
GDP	*GDP*	The nominal value of the country GDP in EUR million	World Bank
Euro Area	*EMU*	A dummy variable taking the value of 1 if the bank is in one of the Euro area countries and 0 otherwise	ECB
Relative size	*ReS*	The ratio between bank total assets and country GDP	Bankscope and World Bank.
Return on Assets	*ROA*	The ratio between pre-tax profits and total assets. This variable measures the bank profitability, avoiding the effect of fiscal differences among countries	Bankscope
Capitalization	*ETA*	The ratio between equity and total assets. This variable measures the bank capitalization without considering regulatory risk-weights for different asset classes	Bankscope

Table 6

Summary statistics

This table reports the sample mean and standard deviation for all the continuous variables used in the treatment analysis to investigate investors' reaction during the SSM launch. The construction of variables is explained in Table 5. All values refer to 2013, the year before the public launch of the Single Supervisory Mechanism.

	Banks involved in the CA (treated)		Banks not involved in the CA (untreated)		Total sample		Treated vs. untreated
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Diff. in mean
ReS	0.3924	0.3364	0.1690	0.3828	0.2542	0.3803	0.2235***
Sta	6.6336	9.1793	3.1729	3.6721	4.4926	6.5449	3.4607**
GDP	1,090,000	807,000	633,000	753,000	808,000	803,000	457,000***
HHI	803.8444	559.9944	889.7260	496.2553	856.9746	520.8052	-85.8816
ROA	0.0004	0.0131	0.0048	0.0131	0.0031	0.0133	-0.0045*
ETA	0.0643	0.0207	0.1074	0.0941	0.0910	0.0778	-0.0431***

Table 7
The Single Supervisory Treatment effect

This table reports the results of a regression in which the dependent variable is the abnormal return around ECB press announcement related to the launch of the Single Supervisory Mechanism (SSM). Our treatment binary variable, *w*, distinguishes between treated and untreated banks. We control for location in the Euro Area (*EMU*), relative size (*ReS*, i.e., the ratio of total assets over country GDP), the amount of state aids (*Sta*, i.e., the amount of resources devoted to recapitalization and asset relief purposes over the period 2008-2012, as a percentage of 2012 GDP), the nominal GDP of the country (*GDP*), the level of industry concentration (*HHI*, i.e. the Herfindhal-Hirshman index), the bank's profitability (ROA), and capitalization (*ETA*).We assume a heterogeneous response, so that the average treatment effect (ATE) is different from either the average treatment effect on treated (ATET) and the average treatment effect on non-treated (ATENT). Robust standard errors are in parentheses. Source: Authors' elaboration on European Central Bank, Bankscope, and Datastream

Panel A: coefficient estimates

	(1) 4 November 2014	(2) 26 October 2014	(3) 4 November 2014	(4) 26 October 2014
W	-0.01577*	-0.03038***	-0.01734*	-0.02143**
	(0.00833)	(0.00923)	(0.00923)	(0.01042)
EMU	0.00335	0.00767	0.00247	0.00267
	(0.00501)	(0.00542)	(0.00791)	(0.00817)
ReS	0.00105	-0.00072	0.00576	0.00125
	(0.00119)	(0.00116)	(0.00479)	(0.00530)
Sta	0.01130***	0.01309**	0.01035**	0.01963***
	(0.00353)	(0.00636)	(0.00454)	(0.00638)
GDP	-0.00685***	-0.00978***	-0.00989**	-0.02414***
	(0.00246)	(0.00264)	(0.00493)	(0.00561)
HHI	-0.00749***	-0.00179	-0.00982*	-0.00863
	(0.00244)	(0.00191)	(0.00551)	(0.00526)
ROA	0.00817**	0.00932***	0.00791*	0.00786**
	(0.00387)	(0.00305)	(0.00416)	(0.00346)
ETA	-0.00196**	-0.00001	0.00175	-0.00093
	(0.00090)	(0.00092)	(0.00518)	(0.00583)
*w*ReS*	-0.00110	0.01044	-0.00432	0.01094
	(0.00411)	(0.00733)	(0.00505)	(0.00936)
*w*Sta*	-0.01573***	-0.01064	-0.01590**	-0.01391
	(0.00442)	(0.00715)	(0.00638)	(0.01277)
*w*GDP*	0.00522	-0.00253	0.00381	-0.00050
	(0.00589)	(0.00734)	(0.00611)	(0.00689)
*w*HHI*	0.01544***	-0.01231	0.01418***	-0.00984
	(0.00435)	(0.00923)	(0.00533)	(0.01057)
*w*ROA*	-0.02266**	0.02516**	-0.01560*	0.01039
	(0.00988)	(0.01231)	(0.00881)	(0.01249)
*w*ETA*	-0.00748	-0.00456	-0.01850	0.01129
	(0.02347)	(0.03743)	(0.02357)	(0.04418)
Squared terms	NO	NO	YES	YES
Constant	-0.00688**	-0.00075	-0.00971***	-0.00184
	(0.00264)	(0.00273)	(0.00341)	(0.00384)
Observations	118	118	118	118
R-squared	0.24452	0.38503	0.28170	0.44155

Panel B: Market Model Abnormal Returns – Summary statistics of ATE(X), ATET(X), ATENT(X) for Models (1) and (2)

4 /11/2014	Obs	Mean	Std. Dev.	Min	Max
ATE_x	118	-0.01577	0.024064	-0.10536	0.06681
ATET_x	45	-0.01534	0.026014	-0.10481	0.06681
ATENT_x	73	-0.01603	0.022962	-0.10536	0.059388

26/10/2014	Obs	Mean	Std. Dev.	Min	Max
ATE_x	118	-0.03038	0.027217	-0.14407	0.019142
ATET_x	45	-0.03174	0.025607	-0.1081	0.003046
ATENT_x	73	-0.02954	0.028305	-0.14407	0.019142

Table 8
The Single Supervisory Treatment effect – Robustness checks

This table reports the results for the same regression models shown in Table 7, with the following adjustments: Models (1) and (2) are run reducing the sample in order to have a comparable bank size in the subgroups of treated and control banks. Models (3) and (4) are run excluding banks with significant confounding events (e.g., M&As or CEO turnovers) around the announcement date. We control for location in the Euro Area (*EMU*), relative size (*ReS*, i.e., the ratio of total assets over country GDP), the amount of state aids (*Sta*, i.e., the amount of resources devoted to recapitalization and asset relief purposes over the period 2008-2012, as a percentage of 2012 GDP), the nominal GDP of the country (*GDP*), the level of industry concentration (*HHI*, i.e. the Herfindhal-Hirshman index), the bank's profitability (ROA), and capitalization (*ETA*).We assume a heterogeneous response, so that the average treatment effect (ATE) is different from either the average treatment effect on treated banks (ATET) and the average treatment effect on non-treated banks (ATENT). Robust standard errors are in parentheses. Source: Authors' elaboration on European Central Bank, Bankscope, and Datastream

	(1) 4 November 2014	(2) 26 October 2014	(5) 4 November 2014	(6) 26 October 2014
W	-0.01558**	-0.01623**	-0.01761**	-0.02792**
	(0.00725)	(0.00752)	(0.00808)	(0.01066)
EMU	0.00243	-0.00820	0.00197	0.00782
	(0.00575)	(0.00637)	(0.00507)	(0.00532)
ReS	0.00119	-0.00178	0.00117	-0.00005
	(0.00123)	(0.00208)	(0.00122)	(0.00116)
Sta	0.00744**	0.01816***	0.01231***	0.01386**
	(0.00307)	(0.00673)	(0.00339)	(0.00613)
GDP	0.00202	-0.01829***	-0.00741***	-0.00868***
	(0.00295)	(0.00366)	(0.00244)	(0.00258)
HHI	-0.00517**	0.00012	-0.00959***	-0.00052
	(0.00226)	(0.00223)	(0.00196)	(0.00148)
ROA	0.00180	0.00817*	0.00731*	0.00853***
	(0.00264)	(0.00450)	(0.00394)	(0.00286)
ETA	0.00527	-0.00601	-0.00219***	0.00017
	(0.00337)	(0.00573)	(0.00078)	(0.00085)
*w*ReS*	-0.00123	0.01150	-0.00224	0.00785
	(0.00421)	(0.00770)	(0.00490)	(0.01035)
*w*Sta*	-0.01187***	-0.01571**	-0.01562***	-0.01459*
	(0.00411)	(0.00752)	(0.00402)	(0.00782)
*w*GDP*	-0.00365	0.00597	0.00248	-0.00110
	(0.00623)	(0.00792)	(0.00636)	(0.01066)
*w*HHI*	0.01312***	-0.01422	0.01593***	-0.00668
	(0.00433)	(0.00952)	(0.00351)	(0.00811)
*w*ROA*	-0.01628*	0.02632**	-0.00686	0.00799
	(0.00968)	(0.01302)	(0.00693)	(0.01867)
*w*ETA*	-0.01471	0.00143	-0.02413	0.00059
	(0.02427)	(0.03877)	(0.02447)	(0.05233)
Constant	-0.00372*	0.00360	-0.00752***	-0.00157
	(0.00201)	(0.00346)	(0.00273)	(0.00280)
Observations	89	89	104	99
R-squared	0.28216	0.42571	0.27173	0.24138